

भारतीय कृषि
सांख्यिकीय अनुसंधान संस्थान

INDIAN AGRICULTURAL
STATISTICS RESEARCH INSTITUTE



IASRI

संगणक केन्द्र (कृ.सा.अ.स.)
COMPUTER CENTRE

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सांख्यिकी मार्ग दर्शयति

INDIAN AGRICULTURAL STATISTICS RESEARCH INSTITUTE

The Indian Agricultural Statistics Research Institute (IASRI) is a premier Institute for promoting and conducting research and training in Agricultural Statistics in the country for improving planning and evaluation of agricultural research and development.

FUNCTIONS

The IASRI has the following functions:

- To conduct research in experimental designs, sampling methods, statistical genetics, biostatistics and statistical economics;
- To conduct post-graduate and in-service training courses in agricultural statistics and computer applications in agriculture;
- To provide advisory service to agricultural scientists/workers from various agricultural organizations in India and abroad;
- To develop computer software for agricultural research; and
- To provide consultancy service in data processing

ORIGIN & GROWTH

Prof. P.V. Sukhatme, the first Statistical Adviser to the Council, being felicitated by the Director on receiving 1983 Hari Om Ashram Trust award for 'Interaction between Science and Society'.



The Institute on the recommendation of the Royal Commission on Agriculture made a modest beginning in 1930 as a STATISTICAL SECTION of the Indian Council of Agricultural Research (ICAR). The activities of the Statistical Section entered a new phase towards the end of 1943 when following the Bengal famine, the Government of India directed it to undertake research in the methods of collecting crop yield statistics by conducting objective surveys based on the methods of random sampling. This assignment resulted in the development of the use of random sampling method for estimating yield by crop cutting surveys whose efficiency and practicability was demonstrated in different states. The recognition which this method attained was such that in the course of a few years the method was extended practically to the entire country to cover all principal food crops.

In 1944 the Statistical Section undertook statistical analysis of the 10 years data on goat breeding project at Etah in U.P. which led, for the first time, to the recognition of the need for application of statistical techniques to animal sciences. As a result several investigations both of methodological and basic nature followed and statistical techniques became integral part of research and development in animal sciences.

An experimental plot for crop cutting survey.



The Statistical Section was reorganized with a new name STATISTICAL BRANCH in 1945 into two separate units, each under the charge of a statistician dealing with statistical application of research in agriculture and in animal husbandry and was headed by Statistical Adviser to the Council (ICAR). The Council also instituted regular post-graduate training courses for professional statisticians and for research workers in the field of agriculture and animal husbandry. The Statistical Branch soon acquired international recognition as a training and research institution in the field of Agricultural Statistics.

The period between 1951-55 was marked by a multi-pronged activities for development as well as application of survey techniques in varied areas. On the recommendations of two FAO experts, Dr. Frank Yates, Chief Statistician, Rothamsted Experimental Station, Harpenden (UK) and Prof. D.J. Finney of Oxford University (UK), the activities of the Statistical Branch expanded manifolds and in August, 1955, it moved to its present campus at Pusa as a STATISTICAL WING of the ICAR.

In recognition of its significant role as a premier institution of training and research it was rechristened as the INSTITUTE OF AGRICULTURAL RESEARCH STATISTICS (IARS) in July, 1959. A mechanical data processing unit was also then added to the Institute. An important landmark was the installation of an Electronic Computer, IBM-1620 MODEL-II, in 1964. In April, 1970 the Institute was accorded the status of a fulfilled institute headed by a Director. To meet the ever increasing demand for computer facility a third generation computer, Burroughs B-4700 was installed in March, 1977. A large number of general purpose application software have been developed and are available on library tape. In view of Institute's mandate for research in agricultural statistics rather than in agriculture its name was changed to INDIAN AGRICULTURAL STATISTICS RESEARCH INSTITUTE (IASRI) in January, 1978.

The Institute provides selective information service based on International Information System for Agricultural Science & Technology (AGRIS) to scientists in the ICAR institutes and agricultural universities on references to documents relating to areas of their specific interest.

From October 1, 1983 the Institute is also functioning as a Centre of Advanced Studies in Agricultural Statistics and Computer Applications under the aegis of the United Nations Development Programme (UNDP) for a period of 7 years. This aims at developing a centre of excellence with adequate infrastructure and facilities to undertake advanced training programmes and to carry out research in various aspects of agricultural statistics and computer application.



Prof D.J. Finney, the FAO expert in 1952, on his revisit as Key Consultant, UNDP, on the occasion of the IASRI Convocation.



Director General in discussion with Sr. Scientists

The Institute has achieved international recognition for its high quality of research and teaching work in the field of agricultural statistics. A number of research workers from the Institute have served as consultants and advisers in Asian, African and Latin American countries. Also, a number of statisticians and students of the Institute are at present occupying high positions in universities and other academic and research institutions of USA, Canada and other countries.

FUNCTIONAL SET-UP

The Institute has the following six Divisions and four Cells to undertake research, training, consultancy, documentation and dissemination of scientific output.

DIVISIONS

- Design of Experiments and Analysis of Experimental Data;
- Sample Survey Methodology and Analysis of Survey Data;
- Bio-Statistics and Statistical Genetics;
- Forecasting Techniques for Crops, Diseases and Pests;
- Statistical Economics; and
- Computing Science.

CELLS

- Training Administration Cell;
- UNDP Cell;
- Coordination Cell; and
- Monitoring Cell.

DIVISION OF DESIGN OF EXPERIMENTS & ANALYSIS OF EXPERIMENTAL DATA

A permanent activity of the Division since 1955 is to collect information on controlled experiments conducted on crops and animals in different research institutions in the country and to compile it in the form of compendia on National Index of Agricultural Field Experiments and National Index of Animal Experiments, for use in undertaking further studies on scientific lines. Results of experiments conducted during 1945-65 have been published. Recently, the scope of this project has been extended and is renamed as AGRICULTURAL INFORMATION SYSTEM, and is now computer based with necessary software for retrieval of information from tapes. Aside this, a catalogue of useful statistical designs peculiar to *animal* experimentation has been prepared and several new series of designs developed.

Another important activity of the Division is to help in planning, designing and analysis of experiments conducted under the All India Coordinated Agronomic Research Project, Long-term Fertilizer Experiments and Integrated Production Trials involving development of technology and soil health management in various cropping systems. Data generated under these projects are utilized in the estimation/revision of yardsticks of additional production due to improved measures.

Statistical studies specific to dryland agricultural research such as influence of rainfall on crop production, development of suitable statistical parameters based on rainfall and soil moisture availability for crop planning are in progress. Investigations for the development of suitable methodology for the analysis of data repeated over years/places with fixed or partially fixed set of treatments, yield advantages from intercropping systems have been initiated.



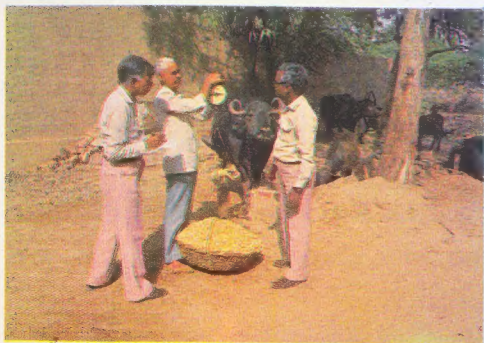
Director in discussion with scientists.

DIVISION OF SAMPLE SURVEY METHODOLOGY AND ANALYSIS OF SURVEY DATA

In the early 1950's the use of random sampling techniques for estimation of livestock numbers was successfully demonstrated. Subsequently several research investigations were carried out for evolving suitable sampling methodology for simultaneous estimation of production of principal livestock products and study of attendant animal husbandry practices. The resulting methodology for estimation of milk, wool, eggs and meat is now being adopted in various States of the country. In addition, suitable sampling methodologies were developed for estimating cost of production of livestock products like milk, wool, poultry and eggs. An operationally feasible systematic sampling technique of milk recording for obtaining reliable estimate of milk production in areas under development has been developed. In order to make continual quantitative appraisal of the progress in milk collection areas of organised milk supply schemes and Intensive Cattle Development areas suitable sampling technique has been developed which *inter alia* would assess the impact of the development programme in the area. Studies for examining the feasibility of utilising the normal field agency of State departments of Animal Husbandry for recording milk production and combining the methods of actual weighment and enquiry for estimation of milk production are in progress. Another study underway relates to development of statistical models for production and culling patterns in poultry for planning of development programmes on sound lines. Study on comparative performance of mixed farming involving crops, livestock, poultry and fish is also in progress.



Milk recording by actual weighment.

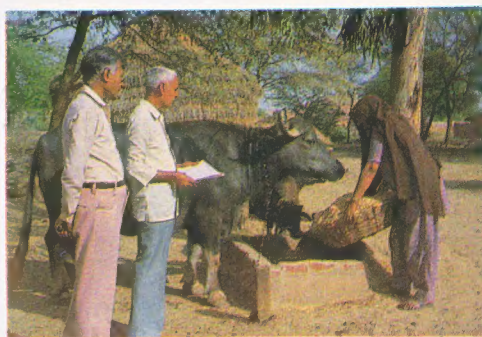


Data collection through actual weighment.

Sample surveys had been undertaken for the assessment of agricultural development programmes, like agricultural district development programmes, high yielding varieties programmes, etc. Sampling methods have also been developed for estimation of fruits and vegetables production in the

country. Currently an important investigation under-way is to study the various constraints in transfer of new agricultural technology under field conditions. With the adoption of modern technology in agriculture, the energy requirements of various crops from different inputs need to be estimated. Accordingly, pilot sample survey has been initiated to estimate the energy requirements for different levels of adoption of modern technology in terms of labour and inputs like irrigation, fertilizers, etc. Another study in progress is to evolve statistical methodology for estimation of post-harvest food grain losses of wheat crop.

In fisheries sector, Pilot studies were conducted during 1949-56 in Kerala, Karnataka, Andhra Pradesh and Tamil Nadu states to develop appropriate sampling methodology for estimating the catch of fish from marine sources. Such studies are now in progress for estimating the catch of fish from various inland resources.



Recording data by careful observation.



Data collection by enquiry.

DIVISION OF BIO-STATISTICS AND STATISTICAL GENETICS

This Division is responsible for giving new statistical techniques for analysis of data in respect of plant and animal breeding as well as conducting fundamental and basic research in statistical genetics. Methods have been developed for estimating variability in self-fertilized crops through progeny row trials and through uniformity trials. Several contributions have been made in developing designs of partial diallel and triallel crosses and their analysis. Significant headway has been made in assessing the genetic structure of almost all the Indian herds/flocks of purebred and crossbred cattle, buffaloes, poultry, sheep and goats. Optimum plans were developed for systematic improvement of dairy herds through progeny testing for cattle and buffaloes. These plans are in operation at various Central and State cattle and buffalo breeding farms. Another important related aspect examined was the progeny testing with auxiliary traits. A general expression for the accuracy of selection based on progeny test was derived and a generalised sire index developed. The problem of measurement of genetic gain from a breeding policy followed at well organised dairy farms over a number of generations was successfully tackled. For improving the overall genetic merit of lactating cows a performance index based on lactation yield, lactation length, calving interval and dry period was developed. In poultry also, a new selection index was developed which included the individual performance for another character in which correlated decline was observed in addition to combining the information about the main trait on individual bird with those of its full-sibs and half-sibs. In the basic research in statistical genetics several problems of population genetics with finite population were modelled. A new theory of conditional stochastic process with application in population genetics was developed.



UNDP experts visiting the site of Lab-to-Land programme.

The current strategy of research in the Division pertains to the areas of animal breeding, animal epidemiology, ecology, crop-insurance and analysis

of sensory data. Statistical methods are being developed for comparing genetic groups based on multiple traits in dairy animals. The culling process in dairy cattle is being examined by both parametric and non-parametric approaches. Different models of fishery growth and harvesting are being examined so as to develop optimal harvesting of fishery and efficient inter-cropping system for maximum production with minimum inputs. With the introduction of crop insurance in India, the time series yield data on different crops from different states are being critically examined with a view to develop sound statistical methods for determining premia and indemnity rates.

DIVISION OF FORECASTING TECHNIQUES FOR CROPS, DISEASES AND PESTS

Crop yield models for pre-harvest forecasting of yield of rice, wheat, jowar, cotton, jute, sugarcane and tobacco were developed using physiological characters at different stages of crop growth. In addition, prediction models based on growth indices at different stages of crop growth have also been developed.

Studies are being initiated to develop integrated models in apple and groundnut crops using data on plant biometric characters, weather parameters and crop inputs as explanatory variables. Time series data on weather parameters are also being used in developing yield models for rice and wheat crops. Another project currently in progress relates to development of methodology for forecasting the incidence and intensity of pests and diseases in mustard crop.

DIVISION OF STATISTICAL ECONOMICS

Studies were conducted on employment and income effects of new farm technology, foodgrains production during plan periods and changes in the



An investigator making biometrical measurements.



Third-generation computer system-Burroughs B-4700.

distribution of land holdings and tenancy structure in the recent past. Work on estimation of potential and average farm yields and extent of realization of potential yields with respect to rice and wheat crops and the factors responsible for the continuance of low yields under farmer's environment has been completed in the selected ORP locations and this research work has been extended to more locations covering different farming systems. The current strategy of research is to develop appropriate stochastic models and methods for quantification of economic forces operating in agricultural sector. To begin with research work has been initiated to develop such models for the Indian agrarian system.

DIVISION OF COMPUTING SCIENCE



Users on Personal Computer.

A large number of general purpose software have been developed for electronic data processing. These include programmes for diallel analysis following Hayman's and Griffing's approach; multivariate analysis technique; analysis of North Carolina design; scaling test; stability analysis following Eberhart - Russell and Perkins-Jink's models; Fisher's response curve for meteorological variables; programme package for analysis of various standard designs, etc. Over a dozen users manuals on these programmes have been brought out. Software for storage and retrieval of agricultural data have also been developed. A source-program library has been created on magnetic tape. The Statistical Packages for Social Sciences (SPSS) as adopted on Burroughs Medium Systems has also been implemented for the facility of users.



Preliminary study of nature of data using computer graphics.

Recently the computer system has been augmented with additional memory and terminals enhancing its computing capabilities. The terminals are being utilized for developing programmes. An intelligent terminal ET-2000 with a plotter and electronic typewriter has also been added to the system.

POST-GRADUATE TRAINING PROGRAMMES

The four regular post-graduate training courses: Professional Statisticians' Certificate Course, Diploma in Agricultural and Animal Husbandry Statistics Course, Senior Certificate Course, and Course in Advanced Computer Programming which were being conducted at the Institute (the first two courses since 1945) were discontinued in 1985 and a new set of short term refresher courses namely Refresher Course in Agricultural Statistics, Senior Level Refresher Course for Statisticians and Agricultural Scientists and also a short term course on the Use of Computer in Agricultural Research have been started from 1986. Apart from this, the Institute also conducts, in collaboration with IARI, the degree courses leading to M.Sc. and Ph.D. degrees in Agricultural Statistics. From September, 1985 an M.Sc. Course in Computer Application in Agriculture has also been initiated. About 1600 students from within the country and 70 students from Asian and African countries have so far successfully completed training in these courses.

LIBRARY & DOCUMENTATION SERVICES

The Institute has an excellent library system to support teaching, research and consultancy. The library procures 300 Journals, Bulletins, etc., and has a collection of more than 25,000 publications. It has 2,000 rare reprint collection and 500 members including students.

To bridge the gap between the scientists and information sources the library brings out 'Current Content Mirror' and 'Current Book Review' regularly. In addition, it provides an excellent reprographic facility for dissemination of information and as also ad hoc select bibliographic service.

The current strategy is to create computerised information data base for on-line storage and retrieval of publications.



Class in progress.



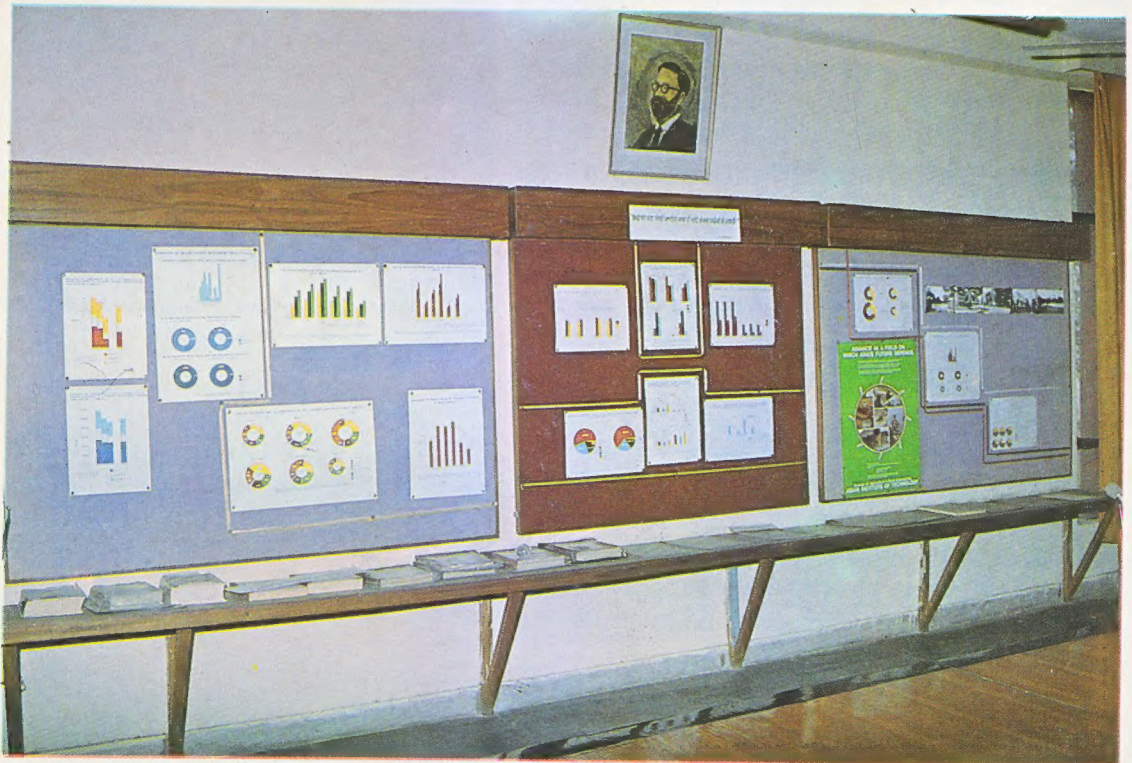
A candidate receiving Ph.D. Degree in Agricultural Statistics at the IARI Convocation.



A view of the library.

PERSONNEL POSITION **(January 1, 1987)**

Scientific	151
Technical	302
Administrative	129
Supporting	112
Total	694



Visual display of research findings.

INDIAN AGRICULTURAL STATISTICS RESEARCH INSTITUTE

FUNCTIONAL SET-UP

